GERMAN / ENGLISH TRANSLATION OF

German Patent Application DE 33 28 543 A1

Title: Use of a Solid Bowl Screen-Conveyor Centrifuge for the Separation of Fine-Crystalline Solids from a Liquid

YOUR REF: NO. 9131

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(19) Federal Republic of Germany

German Patent Office

(12) **Unexamined Patent Application**

(10) **DE 33 28 543 A1**

(51) Int. Cl.[3]:
B 01 D 43/00
B 04 B 7/15

(21) File No.: P 33 28 543.8
(22) Filing Date: 8 August, 1983
(43) Disclosure Date: 21 March, 1985

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(54) **[Title of the Invention]: Use of a Solid Bowl Screen-Conveyor Centrifuge for the Separation of Fine-Crystalline Solids from a Liquid**

(57) **[Abstract]**

The separation of fine crystalline solids from a liquid, especially the separation of terephthalic acid from acetic acid with ordinary solid bowl centrifuges or screen centrifuges not only poses serious problems, but also does not provide the results that are required nowadays by the processing industries, for example, a crystalline solid concentration of less than 20% residual moisture. By using a solid bowl screen-conveyor centrifuge for the separation of fine crystalline solids from a liquid, especially for the separation of terephthalic acid from acetic acid, a crystalline solid concentrate still having a residual moisture of only 15% can be obtained according to the invention in a particularly simple and economical fashion.

Claims

1. Use of a solid bowl screen-conveyor centrifuge for the separation of fine crystalline solids from a liquid, especially for the separation of terephthalic acid from acetic acid.

2. Use of solid bowl screen-conveyor centrifuge for the separation of fine crystalline solids from a liquid, in which the liquid phase separated from the crystals in the screen part of the centrifuge is fed to the centrifuge feed.

3. Use of solid bowl screen-conveyor centrifuge for the separation of fine crystalline solids from the liquid, in which the centrifuge receives the solid-liquid mixture at a temperature between about 70 to 90°C.

4. Use of a cocurrent solid bowl screen-conveyor centrifuge for the separation of fine crystalline solids from liquid, in which the screen part of the centrifuge is designed to be cylindrical or conical.

Attachment for the patent application of the
Klöckner-Humboldt-Deutz Corporation

Dated 5 August 1983

Use of a Solid Bowl Screen-Conveyor Centrifuge for the Separation of Fine-Crystalline Solids from a Liquid

The invention relates to the use of a solid bowl screen-conveyor centrifuge for the separation of fine-crystalline solids from a liquid, especially for the separation of terephthalic acid from acetic acid.

Thus far a crystalline solid concentrate with a residual moisture of only about 26 to 30% can be recovered with the known solid bowl centrifuges or screen centrifuges during the separation of fine crystalline solids from a liquid. Special problems, however, are posed by the separation of terephthalic acid from acetic acid, in which the terephthalic acid is present in a crystalline structure in the particle size range between about 5 and 60 µm. Since the fine crystalline solids separated from the liquid cannot be further processed directly with a moisture content of more than 20%, the crystalline solid concentrate recovered in the centrifuges just mentioned with about 30% moisture must be subjected to final dewatering or drying. This, however, is associated with increased labor, time demands and costs.

The object of the invention is to permit the separation of fine crystalline solids from the liquid in a particularly simple and economical fashion.

It was surprisingly found that during use of a solid bowl screen-conveyor centrifuge according to the invention for the separation of fine crystalline solids from a liquid, especially for the separation of terephthalic acid from acetic acid, a crystalline solid concentrate with a residual moisture of less than 20% can be obtained. The crystalline solid concentrate recovered in this way with a residual moisture of less than 20% can therefore be sent to further processing very advantageously without special final dewatering. This is a particular advantage, if the crystalline

solid concentrate separated from the liquid is terephthalic acid, which is used or required for the production of synthetic fibers.

In another embodiment of the invention, during use of the solid bowl screen conveyor centrifuge for the separation of fine crystalline solids from a liquid, the liquid phase separated in the screen part of the centrifuge from crystals is fed to the centrifuge feed. In this way all crystalline solids can be recovered very advantageously without any loss and without adversely affecting the throughput capacity of the centrifuge on this account.

According to another advantageous embodiment of the invention, during use of a solid bowl screen-conveyor centrifuge for the separation of fine crystalline solids from the liquid, the solid-liquid mixture is fed to the centrifuge at a temperature between about 70 and 90°C. Owing to the fact that the separation of the fine crystalline solids from the liquid occurs in the centrifuge at a temperature between about 70 and 90°C, a crystalline solid concentrate that still contains only about 14 to 15% residual moisture can be recovered very advantageously, as experiments have shown.

In another embodiment of the invention the use of a cocurrent solid bowl conveyor centrifuge with a connected screen part according to German Patent Application DE-OS 30 43 717 has proved to be particularly suitable for the separation of fine crystalline solids from a liquid, in which the screen part of the centrifuge is designed to be cylindrical or conical.

As practical experiments have shown, a crystalline terephthalic acid concentrate still having a residual moisture of only 15.5% can be obtained with a solid bowl screen-conveyor centrifuge during the separation of terephthalic acid from acetic acid. These results could be achieved even though the terephthalic acid crystals present in the acetic acid were smaller in their dimensions than the openings in the screen part of the solid bowl screen-conveyor centrifuge. The good result achieved with the solid bowl screen-conveyor centrifuge is therefore considered particularly surprising.

Practical example

A solid bowl screen-conveyor centrifuge with a cylindrical-conical solid bowl part and the screen part connected to the conical solid bowl part was supplied with a terephthalic acid-acetic acid mixture at a temperature of 20°C at a rate of 250 L per hour. The amount of terephthalic acid in the feed was 220 g/L and the terephthalic acid had a particle size range from 0 to 50 µm.

The separation of terephthalic acid from acetic acid in the solid bowl screen-conveyor centrifuge occurred in a centrifugal field at 935 g and a speed difference between the centrifuge drum and the feed screw of 6 rpm. The terephthalic acid crystals delivered by the screen part of the centrifuge had a remaining moisture content of only 15.5%. The amount of liquid phase passing through the screen openings was 22.4 L/h with a terephthalic acid crystal content of 655 g/L. This screening was therefore fed back to the centrifuge feed. In this way all the terephthalic acid crystals present in the screenings could be subjected again to the separation of the acetic acid and recovered in so doing without adversely affecting the separation effect or throughput capacity of the centrifuge.

The screenings can also optionally be sent very advantageously to the production process connected to the centrifuge from which the terephthalic acid-acetic acid mixture is continuously supplied to the centrifuge for dewatering.

In addition to the separation of terephthalic acid from acetic acid, the solid bowl screen-conveyor centrifuge according to the invention can also be used very advantageously and with the same good results for the separation of, say, para-xylene, PVC, KCl crystallizate or milk sugar from the liquid. The object of the invention is therefore not restricted to the practical example.